and earthy salts. On analysis this substance gives the formula

$$C_{20}\ H_{16}\ O_{16}\ S_2,$$

corresponding to

$$C_{20}\ H_{10}\ O_4 + S_2\ O_6 + H_6\ O_6.$$

That the sulphuric acid exists in this body, as such, is shown by the fact that, on treating it with pure potash, the whole of the sulphur separates as sulphate of potash. This substance is denominated sulpho-sassafras by Sir Robert Kane.

During the reaction of the sulphuric acid and oil of sassafras, in order to produce this body, very small quantities should be operated on, and the mixture kept perfectly cool, so that no effervescence, or violent reaction, should take place. If there be the slightest elevation of temperature, the substance in question is decomposed, sulphurous acid is evolved, and a resinoid black material is produced, which does not contain sulphuric acid, but for which, from the complexity of the reaction accompanying its formation, and the great difficulty of obtaining it absolutely pure, Sir Robert Kane does not at present wish to propose a formula.

M. Donovan, Esq., continued the reading of his paper on the Nature of the Agency which produces the Effects called Galvanic, Electro-magnetic, Magneto-electric, and Thermo-electric.

To support the opinion of identity, and to effect other objects, one of the chief of which is to show the absolute quantity of electricity with which matter is associated, Professor Faraday makes use of the following law, viz.: "If the same absolute quantity of electricity pass through the galvanometer, whatever may be its intensity, the deflecting force upon the magnetic needle is the same." The general method of proof of the truth of this law was to charge a Leyden battery with a certain number of turns of a powerful plate electric machine, varying the number of jars employed from eight to fifteen; to transmit the charge through a galvanometer, and to note the

deflection. The charge was transmitted through various media, all intended to retard it more or less, and thus to affect the galvanometer with various intensities of electricity. In all cases the deflection of the needle was the same, no matter what the intensity: hence Faraday concluded that his law was proved.

To invalidate the inferences and proofs thus drawn, Mr. Donovan brought forward a number of considerations to show that, in all Faraday's experiments, the intensity of the electrical discharges employed was the same or commensurate with the deflection of the needle; and that it is the intensity of the electricity which passes through the galvanometer, and not its quantity, that determines the degree of deflection, the highest intensities producing the greatest deflection.

We should be cautious, therefore, Mr. Donovan observed, in applying Faraday's law: and if the law fail, the comparison drawn by him between the quantity of electricity produced during chemical action, to be immediately noticed, and that discharged from an electric machine, cannot be considered as proved. The comparison is this: Faraday found that by connecting a galvanometer with a wire of platinum and a wire of zinc, each being $\frac{1}{18}$ inch in diameter, and plunging their other ends $\frac{5}{8}$ inch deep in a mixture of four ounces of water and one drop of sulphuric acid, during $\frac{8}{150}$ of a minute, the deflection of the galvanometer amounted to exactly the same degree as when, in a former experiment, he passed a charge of common electricity through the galvanometer, amounting to thirty turns of the large plate-machine received in fifteen jars. Each turn of the machine afforded 300 or 360 dense sparks. Hence, according to the law, Professor Faraday inferred the equality of the two "absolute quantities" of electricity from the equal deflection of the needle in both cases. The double purpose of this experiment was still further to support the inferred identity of voltaic and frictional electricity, and to establish the estimate, already alluded to, of the enormous quantity of electricity with which matter is naturally associated.

In order to discover how far the experiment supports either of these positions, Mr. Donovan adduced counter-experiments, in which combinations of zinc and copper were acted on by dilute acid of different strengths until dissolved. The solution took place in different periods of time, and, consequently, the electricity evolved during any given period was unequal in quantity, in some cases very much so; yet in all of them the effect on the galvanometer was the same.

These experiments appear incompatible with Faraday's law of equal quantities of electricity producing equal deflections, irrespectively of other circumstances. Support is, consequently, withdrawn by them from his estimate of the enormous quantity of electricity naturally associated with matter.

The following note by Professor Mac Cullagh was read.

Let a surface A of the second order be represented by the equation

$$\frac{x^2}{P_0} + \frac{y^2}{Q_0} + \frac{z^2}{R_0} = 1,$$

its primary axis being that of x. Through a given point S, whose coordinates are x', y', z', conceive three surfaces confocal with A to be described, and let P, P', P'' be the squares of their primary semiaxes. Then, if normals drawn to these surfaces respectively at the point S be the axes of a new system of coordinates ξ, η, ζ, and if we put

$$P - P_0 = k, \qquad P' - P_0 = k', \qquad P'' - P_0 = k'',$$

$$\frac{x'^2}{P_0} + \frac{y'^2}{Q_0} + \frac{z'^2}{R_0} = f,$$

the equation of the surface A, referred to the new coordinates, will be

$$\frac{\xi^2}{k} + \frac{\eta^2}{k'} + \frac{\zeta^2}{k''} = (f - 1)\left(\frac{\xi_0\xi}{k} + \frac{\eta_0\eta}{k'} + \frac{\zeta_0\zeta}{k''} - 1\right)^2, \qquad (a)$$

where ξ_0, η_0, ζ_0 are the coordinates of its centre.